

Rare Plants of Bighorn Canyon National Recreation Area

Prepared for the
National Fish and Wildlife Foundation
and
Bighorn Canyon National Recreation Area,
National Park Service

by
Bonnie Heidel and Walter Fertig

June, 2000



MONTANA
**Natural Heritage
Program**

Rare Plants of Bighorn Canyon National Recreation Area

Prepared for
National Fish and Wildlife Foundation
1120 Connecticut Avenue NW, Suite 900
Washington, D.C. 20036
and
Bighorn Canyon National Recreation Area,
National Park Service

National Plant Conservation Initiative Grant No. 98-084-002

by
Bonnie Heidel
Montana Natural Heritage Program
Montana State Library
P.O. Box 201800
Helena, Montana 59620-1800

and

Walter Fertig
Wyoming Natural Diversity Database
University of Wyoming
P.O. Box 3381
Laramie, Wyoming 82071-3381

© 2000 Montana Natural Heritage Program

This document should be cited as follows:

Heidel, B. and W. Fertig. 2000. Rare plants of Bighorn Canyon National Recreation Area.
Report to the National Fish and Wildlife Foundation and Bighorn Canyon National Recreation
Area. Montana Natural Heritage Program, Helena, and Wyoming Natural Diversity Database,
Laramie. 63 pp. plus appendices.

Executive Summary

We conducted systematic surveys of Bighorn Canyon National Recreation Area (NRA) and documented new records for 17 of 25 rare plant species known or suspected to occur in the area.

Six globally rare species were found in the NRA, of which five are sufficiently rare to warrant special management attention. For three of the species, Bighorn Canyon NRA is one of the few areas where they occur that is managed primarily for natural and wildlife values, and is critical to their long-term viability. They include:

- Bighorn fleabane (*Erigeron allocotus*; global rank - G3)
- Persistent-sepal yellowcress (*Rorippa calycina*; global rank - G3)
- Hairy prince's-plume (*Stanleya tomentosa* var. *tomentosa*; global rank - G3T3).

Based on survey results, we also identified key tasks that advance the conservation of rare plant species in Bighorn Canyon NRA:

- Control noxious weeds.
- Evaluate the effects of management actions on the five globally rare species in the course of planning.
- Initiate monitoring of three species
- Identify the most vulnerable habitats of globally rare species as places of special management concern

This report summarizes information on the identification, biology, habitat, and distribution of the 25 globally and state rare plant species that are within the Bighorn Canyon NRA. These data are intended to help resource managers develop and prioritize management and monitoring plans and to identify important concentrations and habitats of rare species. It also contributes to evaluation of rare plant conservation priorities rangewide and statewide.

Acknowledgements

We are grateful for the assistance and interest of National Park Service staff. The project was coordinated by Rick Lasko, with the able assistance of Martina Keil and Laura Hudson. Initial project plans benefited from reviews by Laura Hudson and Peggy Olwell. Oversight and helpful logistical comments were provided by Robert Byrne, Theo Hugs, and Bonnie Winslow. This project also benefited from information and observations provided by John Osgood, Jim Staebler, and Suzanne Morstad. Boat transportation was coordinated by Chris Ryan; with Wendy Bredow, Jenny Byrne, Chuck Huston, and Diane Jurgens at the helm.

Access to National Park Service land across private property in the Dryhead area was arranged with the kind permission of landowners.

The coordination and support of Gary Kania and Beth DeCarolis on behalf of the National Fish and Wildlife Foundation are gratefully acknowledged.

Laura Welp of the Wyoming Natural Diversity Database (WYNDD) assisted with field surveys in 1999. George Jones of WYNDD also contributed useful information on vegetation of the Bighorn Canyon.

The digitizing and production of GIS maps was coordinated by Cedron Jones, Montana Natural Heritage Program (MTNHP), with Montana element occurrence processing work by Martin Miller, report formatting by Margaret Beer, scanning of photographs and illustrations by John Hinshaw, and editing by Sue Crispin. The topographic relief map was produced by Duane Lund, Montana Natural Resource Information System. This project also benefited from the coordination contributions of Sue Crispin and Melony Bruhn of MTNHP.

The authors thank Hollis Marriott, The Nature Conservancy, for her contributions in defining and planning the project, and all botanists who reviewed specimens and were consulted in the course of this study, including Ronald Hartman, B. E. Nelson, Robert Dorn, Matt Lavin, Peter Stickney, A. A. Reznicek, and Mary Barkworth. Use of the herbarium facilities at University of Montana, University of Wyoming, and Bighorn Canyon NRA Interpretive Headquarters is greatly appreciated.

Special thanks are extended to Alma Snell, whose knowledge of culturally-significant plants is an inspiration.

This National Plant Conservation Initiative project was supported by a challenge cost-share grant agreement of the National Fish and Wildlife Foundation involving the Montana Natural Heritage Program, the National Park Service and the Wyoming Natural Diversity Database.

Table of Contents

Executive Summary	i
Acknowledgements	ii
Introduction	1
Study Area	1
Setting	1
Climate	3
Geology and Landforms	3
Vegetation	3
Flora	4
Methods	4
Results	5
Globally-rare Plant Species Summaries	7
<i>Erigeron allocotus</i>	7
<i>Eriogonum brevicaule</i> var. <i>canum</i>	10
<i>Lesquerella leskei</i>	13
<i>Rorippa calycina</i>	16
<i>Stanleya tomentosa</i> var. <i>tomentosa</i>	20
<i>Sullivantia hapemanii</i> var. <i>hapemanii</i>	23
State Rare Plants	29
<i>Agrimonia gryposepala</i>	29
<i>Arabis demissa</i> var. <i>languida</i>	30
<i>Aster glaucodes</i>	31
<i>Astragalus aretioides</i>	32
<i>Astragalus geyeri</i> var. <i>geyeri</i>	34
<i>Astragalus oreganus</i>	36
<i>Carex gravida</i> var. <i>gravida</i>	37
<i>Cleome lutea</i>	39
<i>Delphinium geyeri</i>	40
<i>Eupatorium maculatum</i> var. <i>brunneri</i>	41
<i>Grayia spinosa</i>	43
<i>Leptodactylon caespitosum</i>	44
<i>Mentzelia pumila</i>	46
<i>Musineon vaginatum</i>	47
<i>Oxytropis besseyi</i> var. <i>fallax</i>	48
<i>Oxytropis besseyi</i> var. <i>ventosa</i>	50
<i>Senecio eremophilus</i> var. <i>eremophilus</i>	51
<i>Sphenopholis intermedia</i>	53
<i>Stipa lettermannii</i>	54
Discussion and Management Recommendations	56
Literature Cited	60

Tables

Table 1. Summary of the flora of Bighorn Canyon National Recreation Area.....	4
Table 2. Rare vascular plant species of Bighorn Canyon National Recreation Area.....	6
Table 3. Population sizes of <i>Sullivantia hapemannii</i> var. <i>hapemannii</i> in Bighorn Canyon.....	10

Figures

Figure 1. Bighorn Canyon NRA study area.....	1
Figure 2. Topography of Bighorn Canyon NRA.....	2
Figure 3. Climate diagrams for Yellowtail Dam, MT and Lovell, WY.....	3
Figure 4. Illustration of <i>Erigeron allocotus</i>	7
Figure 5. Photo of <i>Erigeron allocotus</i>	7
Figure 6. Montana and Wyoming county distribution of <i>Erigeron allocotus</i>	8
Figure 7. Distribution of <i>Erigeron allocotus</i> in Bighorn Canyon NRA.....	8
Figure 8. Mountain mahogany and escarpment habitats of <i>Erigeron allocotus</i>	8
Figure 9. Canyon rim habitat of <i>Erigeron allocotus</i>	9
Figure 10. Illustration of <i>Eriogonum brevicaule</i> var. <i>canum</i>	10
Figure 11. Photo of <i>Eriogonum brevicaule</i> var. <i>canum</i>	11
Figure 12. Montana and Wyoming county distribution of <i>Eriogonum brevicaule</i> var. <i>canum</i>	11
Figure 13. Distribution of <i>Eriogonum brevicaule</i> var. <i>canum</i> in Bighorn Canyon NRA.....	11
Figure 14. Chugwater Formation habitat of <i>Eriogonum brevicaule</i> var. <i>canum</i>	12
Figure 15. Limestone habitat of <i>Eriogonum brevicaule</i> var. <i>canum</i>	12
Figure 16. Photo of <i>Lesquerella lesicci</i>	14
Figure 17. Montana and Wyoming county distribution of <i>Lesquerella lesicci</i>	14
Figure 18. Distribution of <i>Lesquerella lesicci</i> in Bighorn Canyon NRA	14
Figure 19. Escarpment habitat of <i>Lesquerella lesicci</i>	15
Figure 20. Illustration of <i>Rorippa calycina</i>	16
Figure 21. Photo of <i>Rorippa calycina</i>	17
Figure 22. Montana and Wyoming county distribution of <i>Rorippa calycina</i>	17
Figure 23. Distribution of <i>Rorippa calycina</i> in Bighorn Canyon NRA	17
Figure 24. Inlet habitat of <i>Rorippa calycina</i>	18
Figure 25. Shoreline habitat of <i>Rorippa calycina</i>	18
Figure 26. Illustration of <i>Stanleya tomentosa</i> var. <i>tomentosa</i>	20
Figure 27. Photo of <i>Stanleya tomentosa</i> var. <i>tomentosa</i>	21
Figure 28. Montana and Wyoming county distribution of <i>Stanleya tomentosa</i> var. <i>tomentosa</i>	21
Figure 29. Distribution of <i>Stanleya tomentosa</i> var. <i>tomentosa</i> in Bighorn Canyon NRA	22
Figure 30. Ridge habitat of <i>Stanleya tomentosa</i> var. <i>tomentosa</i>	22
Figure 31. Illustration of <i>Sullivantia hapemanii</i> var. <i>hapemanii</i>	23
Figure 32. Photo of <i>Sullivantia hapemanii</i> var. <i>hapemanii</i>	24
Figure 33. Montana and Wyoming county distribution of <i>Sullivantia hapemanii</i> var. <i>hapemanii</i>	24
Figure 34. Distribution of <i>Sullivantia hapemanii</i> var. <i>hapemanii</i> in Bighorn Canyon NRA	24
Figure 35. Spring-fed habitat of <i>Sullivantia hapemanii</i> var. <i>hapemanii</i>	25
Figure 36. Montana and Wyoming County distribution of <i>Agrimonia gryposepala</i>	29
Figure 37. Distribution of <i>Agrimonia gryposepala</i> in the Montana portion of Bighorn Canyon NRA.....	29
Figure 38. Montana and Wyoming county distribution of <i>Arabis demissa</i> var. <i>languida</i>	30
Figure 39. Distribution of <i>Arabis demissa</i> var. <i>languida</i> in the Montana portion of Bighorn Canyon NRA.....	31
Figure 40. Montana and Wyoming county distribution of <i>Aster glaucodes</i>	32
Figure 41. Distribution of <i>Aster glaucodes</i> in the Montana portion of Bighorn Canyon NRA.....	32
Figure 42. Illustration of <i>Astragalus aretioides</i>	33

Figure 43. Montana and Wyoming county distribution of <i>Astragalus aretioides</i>	33
Figure 44. Distribution of <i>Astragalus aretioides</i> in the Montana portion of Bighorn Canyon NRA.....	33
Figure 45. Illustration of <i>Astragalus geyeri</i> var. <i>geyeri</i>	34
Figure 46. Montana and Wyoming county distribution of <i>Astragalus geyeri</i> var. <i>geyeri</i>	35
Figure 47. Distribution of <i>Astragalus geyeri</i> var. <i>geyeri</i> in the Montana portion of Bighorn Canyon NRA.....	35
Figure 48. Illustration of <i>Astragalus oreganus</i>	36
Figure 49. Montana and Wyoming county distribution of <i>Astragalus oreganus</i>	36
Figure 50. Distribution of <i>Astragalus oreganus</i> in the Montana portion of Bighorn Canyon NRA.....	37
Figure 51. Illustration of <i>Carex gravida</i> var. <i>gravida</i>	37
Figure 52. Montana and Wyoming county distribution of <i>Carex gravida</i> var. <i>gravida</i>	38
Figure 53. Distribution of <i>Carex gravida</i> var. <i>gravida</i> in the Montana portion of Bighorn Canyon NRA.....	38
Figure 54. Illustration of <i>Cleome lutea</i>	39
Figure 55. Montana and Wyoming county distribution of <i>Cleome lutea</i>	39
Figure 56. Distribution of <i>Cleome lutea</i> in the Montana portion of Bighorn Canyon NRA.....	40
Figure 57. Montana and Wyoming county distribution of <i>Delphinium geyeri</i>	40
Figure 58. Distribution of <i>Delphinium geyeri</i> in the Montana portion of Bighorn Canyon NRA.....	41
Figure 59. Illustration of <i>Eupatorium maculatum</i> var. <i>bruneri</i>	41
Figure 60. Montana and Wyoming county distribution of <i>Eupatorium maculatum</i> var. <i>bruneri</i>	42
Figure 61. Distribution of <i>Eupatorium maculatum</i> var. <i>bruneri</i> in the Montana portion of Bighorn Canyon NRA.....	42
Figure 62. Illustration of <i>Grayia spinosa</i>	43
Figure 63. Montana and Wyoming county distribution of <i>Grayia spinosa</i>	43
Figure 64. Distribution of <i>Grayia spinosa</i> in the Montana portion of Bighorn Canyon NRA	44
Figure 65. Illustration of <i>Leptodactylon caespitosum</i>	44
Figure 66. Montana and Wyoming county distribution of <i>Leptodactylon caespitosum</i>	45
Figure 67. Distribution of <i>Leptodactylon caespitosum</i> within Bighorn Canyon NRA.....	45
Figure 68. Montana and Wyoming county distribution of <i>Mentzelia pumila</i>	46
Figure 69. Distribution of <i>Mentzelia pumila</i> in the Montana portion of Bighorn Canyon NRA.....	46
Figure 70. Montana and Wyoming county distribution of <i>Musineon vaginatum</i>	47
Figure 71. Distribution of <i>Musineon vaginatum</i> in the Montana portion of Bighorn Canyon NRA.....	48
Figure 72. Montana and Wyoming county distribution of <i>Oxytropis besseyi</i> var. <i>fallax</i>	49
Figure 73. Distribution of <i>Oxytropis besseyi</i> var. <i>fallax</i> in the Montana portion of Bighorn Canyon NRA	49
Figure 74. Montana and Wyoming county distribution of <i>Oxytropis besseyi</i> var. <i>ventosa</i>	50
Figure 75. Distribution of <i>Oxytropis besseyi</i> var. <i>ventosa</i> in the Montana portion of Bighorn Canyon NRA	51
Figure 76. Illustration of <i>Senecio eremophilus</i> var. <i>eremophilus</i>	51
Figure 77. Montana and Wyoming county distribution of <i>Senecio eremophilus</i> var. <i>eremophilus</i>	52
Figure 78. Dist. of <i>Senecio eremophilus</i> var. <i>eremophilus</i> in the Mont. portion of Bighorn Canyon NRA....	52
Figure 79. Illustration of <i>Sphenopholis intermedia</i>	53
Figure 80. Montana and Wyoming county distribution of <i>Sphenopholis intermedia</i>	53
Figure 81. Distribution of <i>Sphenopholis intermedia</i> in the Montana portion of Bighorn Canyon NRA.....	54
Figure 82. Illustration of <i>Stipa lettermanii</i>	54
Figure 83. Montana and Wyoming county distribution of <i>Stipa lettermanii</i>	55
Figure 84. Distribution of <i>Stipa lettermanii</i> in the Montana portion of Bighorn Canyon NRA.....	55

Appendices

Appendix A. Globally and state rare vascular plant species considered as inventory targets in Bighorn Canyon National Recreation Area

Appendix B. Draft Update to the Flora of Bighorn Canyon National Recreation Area